國立台灣科技大學 114學年 第2學期　課程大綱

Spring 2026 NTUST Course Outline

授課教師：陳建中

Instructor:Jiann-Jone Chen

課程名稱：多媒體通訊

Course Title：Multimedia Communications

2026/11/3

課程代號：EE5813701 Course Code 學分數：3 Credits	必選修：選修/半學年 Required/Electve:Elective/Half Yr. 先修課程： Prerequisites
節次教室：R6(IB-601-2) R7(IB-601-2) R8(IB-601-2) Time/Location	
專業核心能力： Core Professional Competencies	
課程網址： Course Website	

課程宗旨：Course Objectives

This course introduces source coding in information theory and its applications to image and video compression. Topics include visual signal characteristics, image/video formats, entropy coding, Huffman coding, arithmetic coding, and CABAC.

For image coding, classical standards such as JBIG, JPEG, and JPEG 2000 will be covered, including prediction, transform coding, quantization, entropy coding, and rate-distortion optimization. Recent developments in deep image compression and JPEG-AI will also be introduced.

For video coding, the course covers H.261, H.263, MPEG-1/2/4, H.264/AVC, H.265/HEVC, and H.266/VVC. Key technologies such as motion estimation, motion compensation, transform coding, in-loop filtering, rate control, scalability, and CABAC will be discussed.

The course also introduces deep video coding, including learned motion estimation, neural motion compensation, end-to-end rate-distortion optimization, and comparisons with traditional hybrid codecs.

Through lectures, standard documents, software demonstrations, and programming assignments, students will gain a theoretical and practical understanding of modern image and video compression technologies.

課程大綱：Outline of Lectures

Course Outline
1. Introductions
2. Multimedia Signals.
3. Information Theory
4. Image Compression/Deep Image Compression
   - Transform Coding
   - Learned Image Compression
5. Video Coding (H.264/H.266)
   - motion estimation/compenstation
   - Intra/Inter Frame Coding
   - Entropy Coding (CAVLC, CABAC)
   - Learned Video Compression
6. Most Recent Deep Video Coding Systems

講授 Lecture：76%

授課方式： Method of Instruction	分組討論 Group discussion：5% 案例研討 Case study：10% 操做練習 Practical exercises：10% 講授 Lecture：We will assign 6-8 homework assignments, including handwritten and programming exercises, to help students derive basic information theory formulas, and students can run programs for a multimedia communications system to better understand it. The course will ask students to present their final projects as the term exam.%
教科書： Textbooks	No textbook will be used as the main lecture content.
參考書目： References	1. Standard Codecs: Image compression to advanced video coding (Telecommunications) Ghanbari, Mohammed 2. Multimedia Communications: Directions and Innovations Jerry D. Gibson
修課須知： Notice	This course will provide students with lecture recordings, slides, and relevant international standard specification documents for reference. In addition, multimedia standard system programs corresponding to the course progress will be provided, allowing students to execute the programs and gain a practical understanding of the functions and specifications of the overall system. Teaching assistants will also be available to help students with course assignments.
評量方式： Grading	Midterm Exam: 35% Homeworks: 35% Term Exam: 30%
備註說明： Notes	This course will be taught in English. Students with basic English listening ability and familiarity with the professional terminology used in the course should be able to quickly grasp the key concepts. In addition, the course includes introductions to fundamental theories such as probability, information theory, and signal processing. Students with related background knowledge are preferred.